In the Specification:

[0009] Cast polyurethane polishing pads are suitable for planarizing semiconductor, optical and magnetic substrates. The pads' particular polishing properties arise in part from a prepolymer reaction product of a prepolymer polyol and a polyfunctional isocyanate. The prepolymer product is cured with a curative agent selected from the group comprising curative polyamines, curative polyols, curative ~~alchol~~ alcohol amines and mixtures thereof to form a polishing pad. It has been discovered that controlling the amount of NCO reaction group in the prepolymer reaction product can improve porous pads' uniformity throughout a polyurethane casting.

[0011] The polymer is effective for forming porous and filled polishing pads. For purposes of this specification, filler for polishing pads include solid particles that dislodge or ~~disolve~~ dissolve during polishing, and liquid-filled particles or spheres. For purposes of this specification, porosity includes gas-filled particles, gas-filled spheres and voids formed from other means, such as mechanically frothing gas into a viscous system, injecting gas into the polyurethane melt, introducing gas in situ using a chemical reaction with gaseous product,or decreasing pressure to cause disolved gas to form bubbles. The polishing pads contain a porosity or filler concentration of at least 0.1 volume percent. This porosity or filler contributes to the polishing pad's ability to transfer polishing fluids during polishing. Preferably, the polishing pad has a porosity or filler concentration of 0.2 to 70 volume percent. Most preferably, the polishing pad has a porosity or filler concentration of 0.25 to 60 volume percent. Preferably the pores or filler particles have a weight average diameter of 10 to 100 μm. Most preferably, the pores or filler particles have ~~an weight~~ a weight average diameter of 15 to 90 μm. The nominal range of expanded hollow-polymeric microspheres' weight average diameters is 15 to 50 μm.

[0013] For polishing pads containing gaseous pores or gaseous-filled microspheres, a polishing pad's non-uniformity appears to be driven by 1) the temperature profile of the reacting system; 2) the resulting pore expansion in areas where the temperature increases above that of the expansion temperature of the pore while the surrounding polymeric matrix remains not-so-locked in place as to be able to respond; and 3) the viscosity profile of the reacting or solidifying

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polymer matrix as a result of reaction and various local heating and cooling effects. In the case of a pore added through polymeric hollow microspheres, ~~theirTg~~ their Tg is related to the threshhold temperature for response. Polymeric microspheres above this temperature tend to grow and deform in shape. When casting with hollow polymeric microspheres and with the controlled weight percent NCO, the microspheres' pre-casting volume and the microspheres' final volume preferably remains within 8 percent of the average pre-casting volume throughout the cast polyurethane material. Most preferably, the microspheres' final volume remains within 7 percent of the pre-casting volume throughout the cast polyurethane material.

[0015] With Adiprene L325 prepolymers, peak exotherm temperatures reach as high as 264°F (129°C). These temperatures are well above the expansion onset temperature and closely approach the temperatures of maximum expansion for Expancel microsphere 551DU40—the unexpanded microspheres from which 551DE40d42 is ~~produced--275-289°F(135-143°C)~~ produced--275-289°F (135-143°C). Typically, the density in the center of the cast cake is lower due to greater heating and the resulting greater pore expansion. Polishing pads' porosity variation also tends to increase with increasing initial pore volume, increasing material temperatures ~~andincreasing~~ and increasing mass of cast material.

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